SECTION 06 18 00 - FABRICATED STRUCTURAL GLUED-LAMINATED CONSTRUCTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Delegated design.
2. Structural glued-laminated timber.
3. Timber connectors.
4. Factory finishing.
5. Factory assembly of hardware.

B. Related Requirements:

1. Section 01 81 13 “Sustainable Design Requirements”.
2. Section 03 30 00 “Cast-in-Place Concrete” for coordination of placement of baseplates and other embedded components.
3. Section 05 12 00 “Structural Steel Framing” for coordination with structural steel frame.
4. Section 06 10 00 "Rough Carpentry" for dimension lumber items associated with structural glued-laminated timber.
5. Section 06 17 21 “Mass Plywood Panels” for coordination with glued-laminated construction.
6. Section 06 17 19 “Cross-Laminated Timber” for coordination with glued-laminated construction.
7. [**Section 09 91 00 “Painting” for field finishing of glued-laminated construction.]**
8. [**Section 09 93 00 “Staining and Transparent Finishing” for field finishing of glued-laminated construction**.]
9. [**Section 09 96 00 “High-Performance Coatings” for field finishing of glued-laminated construction**.]

1.3 DEFINITIONS

A. Fabricated Structural Glued-Laminated (Glulam) Timber: An engineered, stress-rated timber product assembled from selected and prepared wood laminations bonded together with adhesives and with the grain of the laminations approximately parallel longitudinally, pre-cut in a factory with pre-installed hardware components.

B. AOR: Architect of Record hired by the project owner or the Design-Build General Contractor.

C. SEOR: Structural Engineer of Record hired by the Architect or Design-Build General Contractor.

D. SSEOR: Specialty Structural Engineer of Record hired specifically for the timber system design.

1.4 REFERENCES

A. AITC 110 - Standard Appearance Grades for Structural Glued Laminated Timber; 2001.

B. ANSI 117 - Standard Specification for Structural Glued Laminated Timber of Softwood Species; 2020.

C. ANSI A190.1 - Standard for Wood Products – Structural Glued Laminated Timber; 2017.

D. APA R540 - Builder Tips: Proper Storage and Handling of Glulam Beams, 2019.

E. [ASTM D7612 - Standard Practice for Categorizing Wood and Wood-Based Products According to Their Fiber Sources, 2010(2015).]

1.5 SUBMITTALS

A. Product Data: For each type of product.

1. Include product data on lumber and adhesives.

2. For preservative-treated wood products, include chemical treatment manufacturer's written instructions for handling, storing, installing, and finishing treated material.

3. For proprietary connectors, include product data and installation instructions.

4. For factory-applied sealing product, include product data and application instructions.

B. Coordination Model:

1. Supplier shall provide an accurate three-dimensional (3D) digital model of glued-laminated timber geometry that captures the following:

a. All interfaces with related structural components such as **[steel construction] [and] [concrete construction]**.

b. Coordination with CLT shop drawings in Section 06 17 19 "Cross-Laminated Timber" or MPP shop drawings in Section 06 17 21 "Mass Plywood Panels."

c. Manufacturing and fabrication capabilities and tolerances.

2. Supplier shall provide the digital model in a format that is compatible for Architect's review and coordination with trades involved. Acceptable formats include but are not limited to (.SAT) (.IFC) (.DWG) (.DFX) (.RVT).

C. Shop Drawings:

1. Supplier shall provide 2D shop drawings that track the increased Level of Detail (LOD) throughout the submittal process in the following order:

a. LOD350 Framing Plans:

1) Provide floor plans clearly showing each framing member within the glued-laminated construction scope.

2) Indicate interfaces with related structural trades to be shown for reference purposes only such as [steel construction] [and] [concrete construction].

3) Indicate lamination combinations, camber and species.

4) Identify fire-resistance-rated components, including notation on minimum required wood thicknesses to achieve fire rating, and accessory materials such as fire tape and/or fire caulking.

5) Indicate which members will be exposed to view in complete condition.

b. LOD350 Connection Details:

1) Provide floor plans shown in LOD300 submittal with callouts to unique connection conditions as indicated in the Contract Documents to be shown in enlarged details.

2) Enlarge details to indicate fabrication and installation tolerances in accordance with relevant Specifications Sections.

3) Indicate size, type and grade of all fasteners.

4) Clearly show custom metal fabrications required for each connection condition as indicated in the Contract Documents including grade of steel, weld size and types, fasteners and spacings, and relevant notes to apply to unique instances not captured in the Contract Documents.

5) Acceptance of this submittal will serve as Approval for Fabrication for glulam members as well as custom steel fabrications involved in the erection of glued-laminated construction.

c. LOD400 Single Piece Shop Drawings for Record: Documentation of each unique framing member clearly stating the following information:

1) Section shape.

2) Wood species.

3) Lamination combination.

4) Fire-resistance-rating.

5) Camber.

6) Appearance Grade and edge condition.

7) Completed exposure condition.

8) Location and quantity of instance in Project.

9) Overall and unique dimensions.

10) Fabrication and/or milling.

11) Connections information and fasteners required.

2. The extent to which shop drawing submittals are combined or separated (i.e., by level or LOD) shall be agreed upon between the **[Contractor and supplier] [and design team]** to assist in the development of detailing as it pertains to procurement, trade-partner coordination and overall construction schedule. To aid in this process, a direct line of communication shall be granted between supplier and design team.

D. Samples: Provide a minimum of three samples, with minimum dimension of 12-inch by 12-inch by typical member width, for each finish grade and species combination demonstrating the range of variation to be expected in appearance of structural glued-laminated timber including variations due to specified treatment.

1. Apply specified factory finish to three sides of half-length of each Sample.

E. Mockup: Provide at least one (1) mockup of typical connection prior to fabrication.Note to Specifier: Retain Sustainable Design Submittals language below only for Projects pursuing LEED certification or, revise text for other sustainable design certification programs.

F. Sustainable Design Submittals: Refer to Section 01 81 13 “Sustainable Design Requirements”.

1. MR Credit 3 - BPDO, Sourcing of Raw Materials:

a. Certified Wood: Documentation indicating percentage new wood, percentage Forest Stewardship Council (FSC) and Chain-of-Custody (CoC) certificates for manufacturer and vendor. Include vendor invoice indicating FSC and CoC.

b. Pilot Alternative Compliance Path - Legal Wood: Documentation of wood products from Certified Sources as defined by ASTM D7612 meeting following requirements:

1) 100 percent of all wood is verified to be from Legal (non-controversial) Sources as defined by ASTM D7612.

2) 70 percent of all wood used on the Project is from Responsible Sources as defined by ASTM D7612.

2. MR Credit 4 - BPDO, Material Ingredients:

a. Material Ingredient Report.

3. IEQ Credit 2 - Low-Emitting Materials:

a. Interior Wet-Applied Coatings, Adhesives, Sealants, Grouts and Primers: Certificate stating compliance with California Department of Public Health (CDPH) Standard Method V1.1-2010, including total volatile organic compounds (TVOC) range.

1) Include product data stating VOC content in g/L.

2) Include volume of material applied per product.

b. Composite Wood Installed Within the Building Interior: Certificate stating compliance with California Air Resources Board (CARB) Airborne Toxic Control Measures (ATCM), Phase II for ultra-low-emitting formaldehyde (ULEF) resins or product data stating product does not contain added formaldehyde resins.

Note to Specifier: Retain "Delegated-Design Submittal" Paragraph below if design services have been delegated to Supplier.

G. Delegated-Design Submittal: [**Choose the following as applicable to scope of work**]

1. Timber Gravity System Design: [**Choose one of the following.**]

a. Delegated design of all timber to timber connections.

b. Delegated design of all timber to timber and timber to concrete connections.

c. Delegated design of all timber to timber, timber to concrete, and timber to structural steel connections.

d. Delegated design of the timber gravity system, inclusive of the glulam sizing and engineering, timber to timber connections, timber to concrete, and timber to structural steel connections.

2. Timber Lateral System Design:

a. Delegated design of the timber lateral system including glulam sizing and engineering, timber to concrete connections, and timber to adjoining gravity system connections.

Note to Specifier: Retain "Certificates of Conformance" Paragraph below unless only using stock beams.

H. Certificates of Conformance: Issued by a qualified testing and inspecting agency indicating that structural glued-laminated timber complies with requirements in ANSI A190.1.

I. Method Statements:

1. Rigging Plan: Describe lifting and handling requirements for each different glulam type, taking into consideration openings and cut-outs in component.

2. Bracing Plan:

a. Submit engineered installation method statement and bracing plan, stamped and signed by a SSEOR registered in the jurisdiction where project is located. The plan

shall include an evaluation of temporary loading conditions and bracing of glued-laminated components to structure during installation.

b. Indicate support and connection type of bracing to glulam components.

c. Where concealed connections are not possible, include proposed repair procedures for bracing and other temporary connections.

J. Weather Protection Plan: Submit proposed coverings and removal sequence.

1.6 QUALITY ASSURANCE

A. Approved Vendor: Timberlab, Inc.
Western Office: 1601 NE Columbia Blvd., Portland, OR 97211
Eastern Office: 141 Traction St., Greenville, SC 29611
www.timberlab.com, estimating@timberlab.com
(503) 749-7500

1.7 DELIVERY, STORAGE, AND HANDLING

A. General: Comply with provisions in AITC 111 and APA R540.

B. Individually wrap members using plastic-coated paper covering with water-resistant seams.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

Note to Specifier: Retain "Delegated Design" Paragraph below if Vendor is required to assume responsibility for design.

A. Delegated Design: Engage a qualified professional engineer, as defined in Division 01 Section "Quality Requirements," to design structural glued-laminated timber and connectors.

B. Structural Performance: Structural glued-laminated timber and connectors shall withstand the effects of structural loads shown on Drawings without exceeding allowable design working stresses listed in ANSI 117 or determined according to ASTM D3737 and acceptable to authorities having jurisdiction.

C. Seismic Performance: Structural glued-laminated timber and connectors shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

D. Fire Resistance of Exposed Wood: Exposed wood fire-resistive rating in accordance with applicable building code. Fire resistance of exposed wood members shall be permitted in accordance with Chapter 16 of AWC National Design Specification for Wood Construction (NDS).

Note to Specifier: Include applicable sustainability requirements for project.

E. Sustainability Requirements: Comply with Section 01 81 13 “Sustainable Design Requirements”.

Note to Specifier: Include the following for projects pursuing LEED certification MR Credit 3 - Sourcing of Raw Materials; FSC, PFFC, or SFI Certified Wood.\

1. [Forest Certification: Provide wood products made from forests certified by an FSC-accredited certification body or USGBC-approved equivalent.]

2. VOC limits shall comply with Section 01 81 13 “Sustainable Design Requirements” for composite wood materials, including all adhesives, sealants, coatings and finishes.

a. Prohibit Methylene chloride and perchloroethylene in sealants.

b. Comply with California Air Resources Board (CARB) Airborne Toxic Control Measure (ATCM), Phase II for ultra-low-emitting formaldehyde (ULEF) resins or containing no formaldehyde resins.

2.2 MANUFACTURER

1. Acceptable glued-laminated Timber Manufacturer: Timberlab Laminators, LLC. P.O. Box 297, Drain, OR 97435
2. Substitutions: Not Permitted

2.3 TIMBERLAB STRUCTURAL GLUED-LAMINATED TIMBER

A. General: Timberlab manufactures structural glued-laminated timber that complies with ANSI A190.1 and ANSI 117 or research/evaluation reports acceptable to authorities having jurisdiction.

1. Factory mark each piece of structural glued-laminated timber with AITC Quality Mark or APA-EWS trademark except for fully exposed glulam columns. Place mark on surfaces that are not exposed in the completed Work.
2. Provide structural glued-laminated timber made from solid lumber laminations, except with specific manufacturers tested assemblies.
3. Provide structural glued-laminated timber made with wet-use adhesive complying with ANSI A190.1.

B. Timberlab Species and Grades for Structural Glued-Laminated Timber:

Note to Specifier: Retain first subparagraph below if vendor designs glulam with their SSEOR. Retain second subparagraph if the SEOR designs glulam.

1. [**Alaska cedar**] [**Douglas fir-larch**] [**Southern pine**] [**Spruce**] [**Western Spruce-Pine-Fir**] [**Any species**] <**Insert species**> in grades needed to comply with "Performance Requirements" Article.
2. [**Alaska cedar**] [**Douglas fir-larch**] [**Southern pine**] [**Spruce**] [**Western Spruce-Pine-Fir**] [**Any species**] <**Insert species**> that complies with beam stress classifications indicated on Structural Drawings.

C. Timberlab Species and Grades for Beams and Purlins:

Note to Specifier: Retain first "Species and Beam Stress Classification" subparagraph below if vendor designs glulam with their SSEOR. Retain second subparagraph if the SEOR designs glulam.

1. Species and Beam Stress Classification: **[Ponderosa pine, 16F-1.3E] [Alaska cedar, 20F-1.5E] [Eastern spruce, 20F-1.5E] [Any species, 20F-1.5E] [Any species, 24F-1.7E] [Douglas fir-larch, 24F-1.8E] [Southern pine, 24F-1.8E] [Douglas fir-larch or southern pine, 24F-1.8E] [Southern pine, 30F-2.1E] <Insert species and beam stress classification>**.
2. Species and Beam Stress Classification: Refer to General Structural Notes.

Note to Specifier: Retain one of two options in "Lay-up" Subparagraph below if vendor designs glulam with their SSEOR. Retain second subparagraph if the SEOR designs glulam. Balanced lay-ups are for cantilevered and continuous span applications but can be used for simple spans; unbalanced lay-ups are for simple spans.

3. Lay-up: **[Balanced] [Either balanced or unbalanced.]**

4. Lay-up: Refer to General Structural Notes.

D. Timberlab Species and Grades for Columns:

Note to Specifier: Retain first "Species and Column Stress Classification" subparagraph below vendor designs glulam with their SSEOR. Retain second subparagraph if the SEOR designs glulam.

1. Species and Column Stress Classification: <**Insert species and column stress classification**>.

2. Species and Column Stress Classification: Refer to General Structural Notes.

Note to Specifier: Appearance Grade definitions from AITC 110:

Industrial: Ordinarily suitable for construction in industrial applications, warehouses, garages, and for other uses where appearance is not of primary concern.

Framing: Ordinarily suitable for construction in conventional framing applications such as windows and door headers where appearance is of no concern and the size of the glued laminated timber matches the size of the framing.

Architectural: Ordinarily suitable for construction where appearance is an important requirement.

Premium: The highest standard appearance grade.

E. Appearance Grade: Complying with AITC 110.

1. Framing: Suitable for non-visual applications. Planned as necessary to meet width requirements and non-sanded.

2. Industrial: Suitable for construction when appearance is not the primary concern. Planned on two sides and non-sanded

3. Architectural: Suitable for visual applications. Fill voids as required by AITC 110. Planned on two sides with smooth visual sides.

4. Premium: Suitable when appearance is of the highest concern. Use clear wood inserts, of matching grain and color, for filling voids and knot holes more than 1/4 inch (6 mm) wide, as required by AITC 110. Planned on two sides with all exposed surfaces sanded smooth.

2.4 PRESERVATIVE TREATMENT

Use Categories 1 and 2 are for interior aboveground applications; Use Category 1 is where only protection from insects is required and Use Category 2 is for damp conditions. Use Categories 3A and 3B are for exterior applications; Use Category 3A is where the wood is painted or coated, and Use Category 3B is where it is not painted or coated. Use Category 4A is for ground contact in other-than-severe environments.

A. Preservative Treatment: Where preservative-treated structural glued-laminated timber is indicated, comply with AWPA U1, Use Category 2.

1. Use preservative solution without water repellents or substances that might interfere with application of indicated finishes.

Retain subparagraph below only for southern pine. Incising is not required for southern pine but is required for other species.

2. Do not incise structural glued-laminated timber or wood used to produce structural glued-laminated timber.

Consult fabricators for available treatments. In addition to those preservatives listed, AWP U1 also allows the use of creosote.

B. Preservative: One of the following:

Oxine copper is listed in AWPA U1 for aboveground use with southern pine, western hemlock, and hem-fir, but not coastal Douglas fir; is a water repellent; does not discolor wood; and can be used in contact with agricultural food products.

1. Oxine copper (copper-8-quinolinolate) in a light petroleum solvent.

Pentachlorophenol is listed in AWPA U1 for ground contact and aboveground use with southern pine, coastal Douglas fir, western hemlock, and hem-fir; it does not discolor wood but can only be used on the interior of a building where it is in ground contact and then it requires two coats of urethane, shellac, latex epoxy enamel, or varnish sealer.

2. Pentachlorophenol in light petroleum solvent.

Copper naphthenate is listed in AWPA U1 for ground contact and aboveground use with southern pine, coastal Douglas fir, western hemlock, and hem-fir; it discolors wood.

3. Copper naphthenate in a light petroleum solvent.

ACZA is listed in AWPA U1 for ground contact and aboveground use with southern pine, coastal Douglas fir, western hemlock, and hem-fir; it contains arsenic and discolors wood.

4. Ammoniacal zinc copper arsenate (ACZA) in a water solution.

CCA is listed in AWPA U1 for ground contact and aboveground use with southern pine, coastal Douglas fir, western hemlock, and hem-fir; it contains arsenic and chromium and discolors wood.

5. Chromated copper arsenate (CCA) in a water solution.

ACQ-C is listed in AWPA U1 for ground contact and aboveground use with southern pine, coastal Douglas fir, western hemlock, and hem-fir; it discolors wood and promotes corrosion of fasteners.

6. Ammoniacal copper quat Type A (ACQ-C) in a water solution.

PTI is listed in AWPA U1 for aboveground use with southern pine, coastal Douglas fir, western hemlock, and hem-fir.

7. Propiconazole tebuconazole imidacloprid (PTI) in a water emulsion.

Retain paragraph below for ground contact applications. Treatment is oil borne and discolors wood.

C. After dressing members, apply a copper naphthenate field-treatment preservative to comply with AWPA M4 to surfaces cut to a depth of more than 1/16 inch (1.5 mm).

2.5 TIMBER CONNECTORS

Note to Specifier: European-certified steel connectors are fabricated and shipped with European glulams.

A. Custom Fabricated Metal Connectors:

1. Materials: Unless otherwise indicated, fabricate from the following materials:

a. Structural-steel shapes, plates, and flat bars complying with ASTM A36/ A36M.

b. Round steel bars complying with ASTM A575, Grade M 1020.

c. Hot-rolled steel sheet complying with ASTM A1011/ A1011M, Structural Steel, Type SS, Grade 33.

Note to Specifier: Type 304 stainless steel is usually standard; use Type 316 where subject to salt spray or immersion in salt water. Type 316 is more expensive and cannot be distinguished from Type 304 except by chemical tests.

d. Stainless steel flat bars complying with ASTM A666, [**Type 304**] [**Type 316**].

e. Stainless steel bars and shapes complying with ASTM A276, [**Type 304**] [**Type 316**].

f. Stainless steel plate, sheet, and strip complying with ASTM A240/ A240M or ASTM A666, [**Type 304**] [**Type 316**].

2. Finish steel assemblies and fasteners with rust-inhibitive primer, 2-mil (0.05-mm) dry film thickness.

Note to Specifier: Usually retain last paragraph above for dry use and mild moisture exposure. Delete above and retain paragraph below for more severe wet use.

3. Hot dip galvanize steel assemblies and fasteners after fabrication to comply with ASTM A123/ A123M or ASTM A153/ A153M.

4. Fasteners: Provide all self-tapping screw, dowel, tight-fit pin, through-bolt fasteners for the connection.

5. Wood Plugs:

a. Provide custom wood plugs for any countersunk visible holes, utilizing same species and quality of wood to match the glue-laminated material.

b. Pre-finish wood plugs with sealer and/or stain finish.

B. Pre-Engineered Metal Connectors:

1. Materials:

a. Provide pre-engineered connectors as specified by the SEOR or the SSEOR in the Contract Documents. If a finish (galvanized, stainless, primed, unfinished) for the connector is not specified in the Contract Documents, request clarification from AOR.

b. Fasteners: Provide all fasters per manufacturers testing and recommendation in the size, quantity, and finish required per the contract documents.

c. For fire-rated connection assemblies, provide fire-rated treatment in accordance with manufacturers' approved fire test requirements.

2. Wood Plugs:

a. Provide custom wood plugs, if required, for countersunk visible holes, utilizing same species and quality of wood to match the glued-laminated material.

b. Pre-finish wood plugs with sealer and/or stain finish.

2.6 MISCELLANEOUS MATERIALS

A. End Sealer: Manufacturer's standard, transparent, colorless wood sealer that is effective in retarding the transmission of moisture at cross-grain cuts and is compatible with indicated finish.

1. Basis-of-Design Product: Walker emulsions "K-7067 Clear Sealer"; www.walkeremulsions.com.

B. Penetrating Sealer: Manufacturer's standard, transparent, penetrating wood sealer that is compatible with indicated finish.

1. Basis-of-Design Product: Walker emulsions "K-7067 Clear Sealer"; www.walkeremulsions.com.

C. Apply sealers in two coats per sealer manufacturer's instructions.

2.7 GLULAM FABRICATION

A. Approved Fabricator: Timberlab, Inc., 1601 NE Columbia Blvd., Portland, OR, 97211; (503) 749-7500; www.timberlab.com.

B. Shop fabricate for connections to greatest extent possible, including cutting to length and price milling to receive either custom welded steel connector or pre-engineered connector.

1. Finish exposed surfaces to specified Appearance Grade(s).

C. Camber: When camber is designed per the SEOR or the SSEOR, fabricate horizontal and inclined members of less than 1:1 slope with either circular or parabolic camber equal to the amount specified through design.

D. Where preservative-treated members are indicated, fabricate (cut, drill, surface, and sand) before treatment to greatest extent possible. Where fabrication must be done after treatment, apply a shop-treatment preservative to comply with AWPA M4.

1. Use inorganic boron (SBX) treatment for members not in contact with the ground and continuously protected from liquid water.

2. Use copper naphthenate treatment for members in contact with the ground or not continuously protected from liquid water.

E. End-Cut Sealing: After end cutting each member to final length, and prior to installing any hardware, apply two saturation coats of end sealer to ends and other cross-cut surfaces.

F. Seal Coat: Apply a heavy saturation coat of penetrating sealer on surfaces of each unit after the manufacturing, planning, and sanding (if required per visual grade specification).

G. Fabrication Tolerances: Comply with ANSI A190.1, unless otherwise agreed to between purchaser and manufacturer.

2.8 FIRE-RATED CONNECTIONS

A. Concealed hardware connection required to achieve a minimum fire performance are to be constructed in accordance with either the tested pre-engineered assembly or in accordance with the Contract Documents, whichever is more restrictive.

B. Fire Tape Products: Basis-of-Design Product: TENMAT Firefly 107, Tenmat Inc. USA; www.tenmatusa.com.

2.9 SHOP FINISHING

A. Shop-Installed Finishes:

1. Shop Sealer: Apply End Sealer and Penetrating Sealer as specified in Miscellaneous Materials.

Note to Specifier: Insert stain and/or coating requirement below only if both a final finish is required and if shop finishing is a project requirement; coordinate with section 3.4.

a. Stain and/ or Coatings: Apply shop installed stain and/ or coatings as specified by the AOR. When a shop installed stain and/ or coating is specified, the shop sealer may be omitted if all sides of the glulam are finished.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates in areas to receive structural glued-laminated timber, with Installer present, for compliance with requirements, installation tolerances, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Refer to APA R540 for storage and protection prior to installation.

3.3 INSTALLATION

A. General: Erect structural glued-laminated timber true and plumb and with uniform, close-fitting joints. Provide temporary bracing to maintain lines and levels until permanent supporting members are in place.

1. Handle and temporarily support glued-laminated timber to prevent surface damage, compression, and other effects that might interfere with indicated finish.

2. Bracing Methods:

a. Class A: Friction fit attachment to columns.

b. Class B: Mechanical attachment to column with hole repair putty to match and sand smooth.

c. Class C: Mechanical attachment to column without hole repair.

B. Framing Built into Masonry: Provide 1/2-inch (13-mm) clearance at tops, sides, and ends of members built into masonry; bevel cut ends 3 inches (76 mm); and do not embed more than 4 inches (102 mm) unless otherwise indicated.

C. Cutting: Avoid extra cutting after fabrication. Where field fitting is unavoidable, comply with requirements for shop fabrication.

1. Predrill for fasteners using timber connectors as templates.

2. Coat cross cuts with end sealer.

D. Install timber connectors as indicated.

1. Unless otherwise indicated, install bolts with same orientation within each connection and in similar connections.

2. Install bolts with orientation as indicated or, if not indicated, as directed by Architect.

3.4 TOLERANCES

A. Structural Material Tolerances:

1. Gap between glulam and structural steel components: 1/2-inch.

2. Gap between glulam and concrete: 3/4-inch.

3. Allow extra bearing in adjacent materials and simplify connections for easy field trim of timber elements to allow for coordination of industry standard tolerances at interface.

Note to Specifier: Insert field finishing statement if stain and/or coatings are to be field installed.

3.5 [FIELD FINISHING]

A. **[Preparation: Finish exposed surfaces to remove planning or surfacing marks and to provide a finish equivalent to that produced by machine sanding with No. 120 grit sandpaper.]**

B. **[Field Finishing: Refer to Section [09 91 00 "Painting"] [09 93 00 "Staining and Transparent Finishing"**] [**09 96 00 "High-Performance Coatings"]]**.

Note to Specifier: Insert specific erection tolerances and procedures here to suit Project.

3.6 ADJUSTING

A. Repair damaged surfaces and finishes after completing erection. Replace damaged structural glued-laminated timber if repairs are not approved by Architect.

3.7 PROTECTION

A. Do not remove wrappings on individually wrapped members until they no longer serve a useful purpose, including protection from weather, sunlight, soiling, and damage from work of other trades.

1. Coordinate wrapping removal with finishing work. Retain wrapping where it can serve as a painting shield.

2. Slit underside of wrapping to prevent accumulation of moisture inside the wrapping.

END OF SECTION